

Isotopic Evolution of the Jaguarão Terrane, Southeastern Dom Feliciano Belt in southern Brazil

Rodrigo Fabiano da Cruz^{1,2}, Miguel Angelo Stipp Basei² & Ruy Paulo Philipp³

¹ CPRM - Serviço Geológico do Brasil – SUREG-PA

² USP – Universidade de São Paulo

³ UFRGS – Universidade Federal do Rio Grande do Sul

The Jaguarão Terrane, located in southeastern Brazil and northeastern Uruguay, is a tectonostratigraphic terrane placed in the southeastern Dom Feliciano Belt, the southern segment of Mantiqueira Province. The terrane is constituted by metamorphic complexes of medium-grade metamorphism, intruded by subalkaline peraluminous granitoids. Lithological and structural aspects indicate its continuity to the south, to Uruguay in connection with the Punta del Leste Terrane. LA-ICPMS U-Pb and Lu-Hf zircon data were acquired from key samples from the Arroio Telho and Arroio Grande metasedimentary complexes, which are the main units of the Jaguarão Terrane. Its detrital zircon data showed ages in the range between 3.2 to 0.7 Ga, with main age peaks at 2.2-1.7 Ga, 1.5-1.0 Ga and 1.0-0.7 Ga, and a minor number of older ages (3.1-2.6 Ga). The samples from the subordinate Herval Complex, a metasedimentary sequence placed above the Pelotas Batholith but related to Jaguarão Terrane, indicated a similar detrital zircon provenance with two main intervals in the range 1.5-1.1 Ga and 1.0-0.7 Ga, and minor Paleoproterozoic (2.0-1.7 Ga) and Archean ages (2.8-2.4 Ga). The depositional age of the supracrustal complexes is constrained to populations aged ~ 700 Ma and the youngest detrital grains from all the samples are ~ 630 Ma. The Neoproterozoic metamorphic zircon overgrowths range from 620-570 Ma. The Lu-Hf isotopes from the Meso- to Paleoproterozoic zircons have $\epsilon_{\text{Hf}}(t)$ values ranging from -10 to +10, with dominant slightly positive results, and Hf(t) model ages from Paleoproterozoic to Archean. The Neoproterozoic zircons show $\epsilon_{\text{Hf}}(t)$ values dominantly negative (-15 to +5) and Meso- to Paleoproterozoic Hf(t) model ages. U-Pb geochronology data acquired on zircon from the intrusive granites present crystallization ages ranging between 580 and 570 Ma, which point to a widespread Ediacaran magmatism in the Jaguarão Terrane. Considering the restricted source of

Mesoproterozoic rocks in the Mantiqueira Province and nearby cratonic areas, the obtained data allowed inferring that the source of these detrital populations was mainly located in Southwestern Africa, probably related to the Namaqua Belt. The main source area for the Paleoproterozoic and Archean detrital zircons is likely to be the Congo/Kalahari cratons (Africa). The geological context of the investigated supracrustal complexes and intrusive granites based on the results of isotopic zircon data indicate an origin related to an extensional basin forming by the Gariep rift, starting in the Tonian (~800 Ma), with regional deformation and metamorphism linked to the accretionary and collisional stages (630-570 Ma) of the Dom Feliciano Belt. These episodes of tectonic evolution took place during the amalgamation process of the cratonic blocks from South America platform (Luíz Alves and Rio de la Plata cratons) and southwestern Africa (Congo and Kalahari cratons), leading to the formation of West Gondwana.